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(71) Applicant (for all designated States except US): **UNDER PAR PTY LTD** [AU/AU]; 20 Cranbrook Avenue, Roseville, NSW 2069 (AU).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **CLAREBROUGH, Brett, John** [AU/AU]; 20 Cranbrook Avenue, Roseville, NSW 2069 (AU). **HYDE, Douglas, Gordon** [AU/AU]; C/- Under Par Pty Ltd, 20 Cranbrook Avenue, Roseville, NSW 2069 (AU).

(74) Agent: **BALDWIN SHELSTON WATERS**; 60 Margaret Street, Sydney, NSW 2000 (AU).

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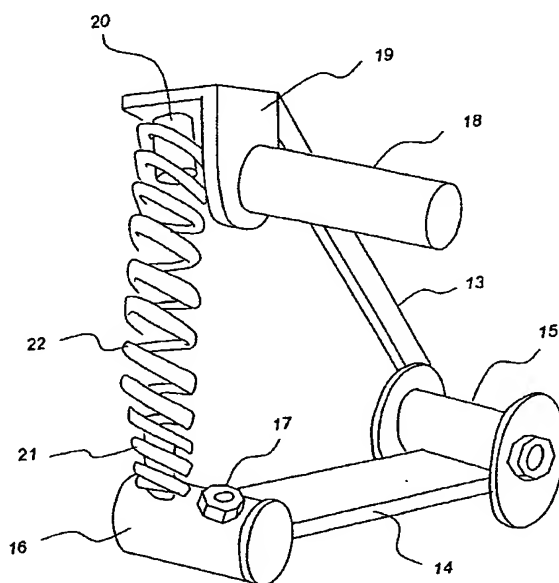
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**Declarations under Rule 4.17:**

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[Continued on next page]

(54) Title: **SUSPENSION ASSEMBLY**



(57) Abstract: A suspension assembly adapted to be fitted to a manually drawn two wheeled golf buggy includes a chassis mount (19) typically arranged to be mounted into the existing axle tube of a conventional golf buggy by way of a spigot (18), a scissor link in the form of a chassis mount arm (13) extending from the chassis mount (18) and a wheel mount arm (14) pivotally connected together by hinge arrangement (15), and a wheel mount sleeve (16) adapted to receive the stub axle of a golf buggy wheel. A compression spring (22) is provided between the chassis mount (19) and the wheel mount (16) allowing for damp resilient movement between the wheel of the golf buggy and the chassis. Variations are also described where the suspension assembly is provided as an integral part of the golf buggy chassis.



MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

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**Published:**

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

## "SUSPENSION ASSEMBLY"

### Field of the Invention

The present invention relates to manually operated (non-motorised) golf buggies of the type used to carry a player's golf bag around the course.

### 5 Background of the Invention

Golf buggies generally have a chassis with two wheels arranged so that it can cradle a golf bag and support itself in a stable, upright position. To move the buggy around the course, the chassis is rotated about the axis of the wheels so that the supporting section of the chassis lifts off the ground thus freeing the wheels to roll as it  
10 is drawn along behind or pushed by the player.

Unfortunately, irregularities in the ground surface are translated directly to the golf buggy handle. This can make manoeuvring difficult or uncomfortable for the player. Ground irregularities will also cause the clubs in the golf bag to rattle against each other with potentially damaging impact. Such rattling also generates an appreciable level of  
15 noise which can be distracting and disruptive to other players on the course.

### Summary of the Invention

Accordingly in one aspect the present invention provides a suspension assembly adapted to be fitted to a golf buggy, including:

- a chassis mount arranged to mount the assembly to the chassis of the buggy;
- 20 a wheel mount arranged to support a wheel of the buggy; and
- a suspension linkage extending between the chassis mount and the wheel mount.

In a further aspect the present invention provides a golf buggy having a chassis and a pair of wheels for travel across a ground surface, said buggy including a pair of suspension assemblies arranged one to each wheel;

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each suspension assembly including a chassis mount arranged to mount the assembly to the chassis of the buggy;

a wheel mount arranged to support a wheel of the buggy; and

a suspension linkage extending between the chassis mount and the wheel mount.

5 Preferably the suspension linkage includes a hinged scissor link supporting relative movement of the chassis mount and the wheel mount against a resilient medium.

Preferably the scissor link includes a chassis mount arm extending from the chassis mount, a hinge arrangement at the distal end of the chassis mount arm, and a wheel mount arm extending from the hinge arrangement to the wheel mount.

10 Preferably the resilient medium comprises a spring extending between the chassis mount and the wheel mount.

In one form of the invention the suspension assembly is adapted to be retrofitted to an existing (prior art) golf buggy, and wherein the chassis mount includes a spigot adapted to be inserted into an axle mounting tube in a conventional golf buggy chassis to  
15 mount the suspension assembly to that chassis.

Preferably the wheel mount includes a sleeve adapted to receive a stub axle on which a corresponding wheel of the golf buggy is rotatably mounted.

Using the present invention, it is possible to provide golf buggies with a simple yet surprisingly effective suspension system. The simplicity of its design allows the system  
20 to be relatively inexpensive, aesthetically acceptable and easily incorporated into the manufacture of buggies, or as an after market retro-fit. The cushioned ride provided by the suspension significantly reduces the potentially damaging rattling of the clubs in the bag. The erratic or "jerky" movements of the buggy handle as it is drawn over rough ground is also substantially diminished. In turn, the ease and comfort of manoeuvring  
25 the buggy is enhanced.

### Brief Description of the Drawings

Preferred embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawings in which:

Fig. 1 shows a typical example of a manually drawn prior art golf buggy together with a golf bag lifted from the bag cradle for clarity;

Fig. 2 is a front elevation of the suspension assembly according to the present invention;

Fig. 3 is a side elevation of the suspension assembly of Fig. 2; and

Fig. 4 is a perspective view of the suspension assembly shown in Figs. 2 and 3.

### Detailed Description of the Preferred Embodiments

The golf buggy 1 shown in Fig. 1 is typical of most manually drawn golf buggies. The golf bag 2 is craddled in the buggy against a bag support 3 and cradle arms 4. The bag 2 is craddled so that its weight allows the buggy to stay upright and supported on the wheels 5 and 6 as well as the support 7. Often, a seat 8 is also provided for the comfort of the player.

In use, the player draws the buggy along using the handle 9. The length of the handle stem 10 is designed so that the chassis 11 of the buggy 1 rotates about the axis of the wheels to disengage the support 7 from the ground.

The wheels 5 and 6 are rigidly mounted to the chassis 11 and any shocks or vibrations caused by irregularities in the ground surface are transmitted directly to the golf bag 2 and the handle 9. This can shake the bag 2 and cause the clubs 12 to impact with each other and the interior of the bag. This is potentially damaging to the clubs and generates a significant level of noise.

The shock loading and vibrations caused by ground irregularities will also produce erratic and "jerky" forces on the handle 9. This can make the buggy 1 difficult and uncomfortable to use and manoeuvre. Incorporating the suspension assembly shown in Figs. 2, 3 and 4 provides the buggy 1 with a smoother operation that substantially reduces the vibration and impact problems discussed above.

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Referring to Figs. 2, 3 and 4, the suspension assembly is shown in isolation from the chassis 11 and wheels 5 or 6. The assembly uses a scissor linkage with a chassis mount arm 13 connected to a wheel mount arm 14 via hinge arrangement 15 for relative angular movement. At the distal end of the wheel mount arm is a wheel mount sleeve 16 with an internal diameter sized to receive the stub axle of the wheels 5 or 6. Locking bolt 17 secures the stub axle within the sleeve 16.

Chassis mounting bar or spigot 18 is sized so that it can be received in the original wheel mounting sleeve of the chassis 11. End plate 19 connects the chassis mounting bar 18 to the chassis mount arm 13. Spigots 20 and 21 are welded to the chassis mount arm and wheel mount arms respectively. Compression spring 22 extends between the spigots. The internal diameter of the spring 22 is conveniently sized for engaging the spigots 20 and 21 with an interference fit.

Although the suspension assembly has been described as incorporating a resilient element in the form of a compression spring 22 it will be appreciated that any resilient element that provides a biasing force opposing any suspension travel of the wheel away from an equilibrium position could be used. It is generally advantageous if the biasing force is proportional to the suspension travel. In place of a compression spring it will be appreciated that the resilient element could for example comprise a polymer or rubber suspension hanger, a gas filled bladder or even be differently arranged such that the suspension linkage is provided by the elastic deformation of a generally horizontal strut cantilevered from the wheel mount. It will also be appreciated that various embodiments of the invention may also include a damping element to reduce oscillations about an equilibrium position.

The impact and vibration of the wheels when travelling over rough ground can be substantially absorbed and accommodated through the scissor action of the suspension assembly against the restoring force of the spring 22. The suspension travel cushions golf bag 2 and the handle 9 against the impact of irregularities in the ground giving the buggy an appreciably smoother and quieter overall operation. This is not only beneficial for the owner of the buggy, but also other players on the course that may otherwise be distracted by the noise from excessive club rattle.

The present invention has been described herein by way of example only.

Ordinary workers in this field will readily recognise many variations and modifications which do not depart from the spirit and scope of the broad inventive concept. For example, telescopically engaging sleeves surrounding the spring may be used instead of the scissor linkage, polymer material or compressible gas may be used for the resilient  
5 element and in more complex versions, a mechanical damper can be included for damped suspension travel. The broad inventive concept may also encompass active suspension whereby a transducer senses the vertical orientation of the buggy and feeds or drains gas from air bag suspension on each wheel.

**CLAIMS:**

1. A suspension assembly adapted to be fitted to a golf buggy, including a chassis mount arranged to mount the assembly to the chassis of the buggy, a wheel mount arranged to support a wheel of the buggy, and a suspension linkage extending between the chassis mount and the wheel mount.  
5
2. A suspension assembly as claimed in claim 1, wherein the suspension linkage includes a hinged scissor link supporting relative movement of the chassis mount and the wheel mount against a resilient medium.
3. A suspension assembly as claimed in claim 2, wherein the scissor link includes a chassis mount arm extending from the chassis mount, a hinge arrangement at the distal end of the chassis mount arm, and a wheel mount arm extending from the hinge arrangement to the wheel mount.  
10
4. A suspension assembly as claimed in claim 3, wherein the resilient medium comprises a spring extending between the chassis mount and the wheel mount.
5. A suspension assembly as claimed in any one of the preceding claims, wherein the chassis mount includes a spigot adapted to be inserted into an axle mounting tube in a conventional golf buggy chassis to mount the suspension assembly to that chassis.  
15
6. A suspension assembly as claimed in any one of the preceding claims, wherein the wheel mount includes a sleeve adapted to receive a stub axle on which a corresponding wheel of the golf buggy is rotatably mounted.  
20
7. A golf buggy having a chassis and a pair of wheels for travel across a ground surface, said buggy including a pair of suspension assemblies arranged one to each wheel, each suspension assembly including a chassis mount arranged to mount the assembly to the chassis of the buggy, a wheel mount arranged to support a wheel of the buggy, and a suspension linkage extending between the chassis mount and the wheel mount, the suspension linkage being adapted to allow relative movement between the wheel mount and the chassis mount in response to travel across irregularities in the ground surface.  
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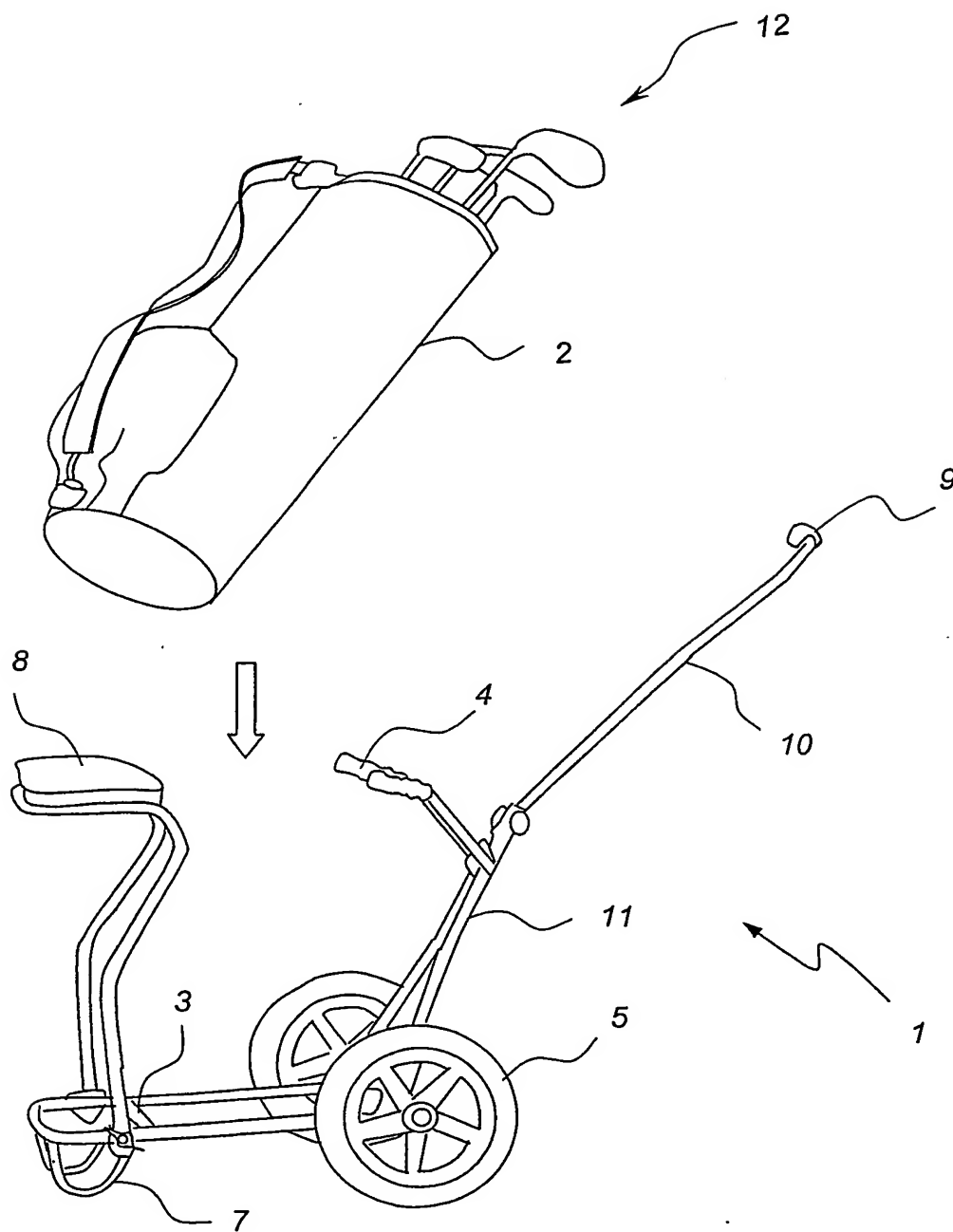
- 7 -

8. A golf buggy as claimed in claim 7, wherein the suspension linkage includes a hinged scissor link supporting relative movement of the chassis mount and the wheel mount against a resilient medium.

5 9. A golf buggy as claimed in claim 8, wherein the scissor link includes a chassis mount arm extending from the chassis mount, a hinge arrangement at the distal end of the chassis mount arm, and a wheel mount arm extending from the hinge arrangement to the wheel mount.

10. A golf buggy as claimed in claim 9, wherein the resilient medium comprises a spring extending between the chassis mount and the wheel mount.

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**FIG. 1**

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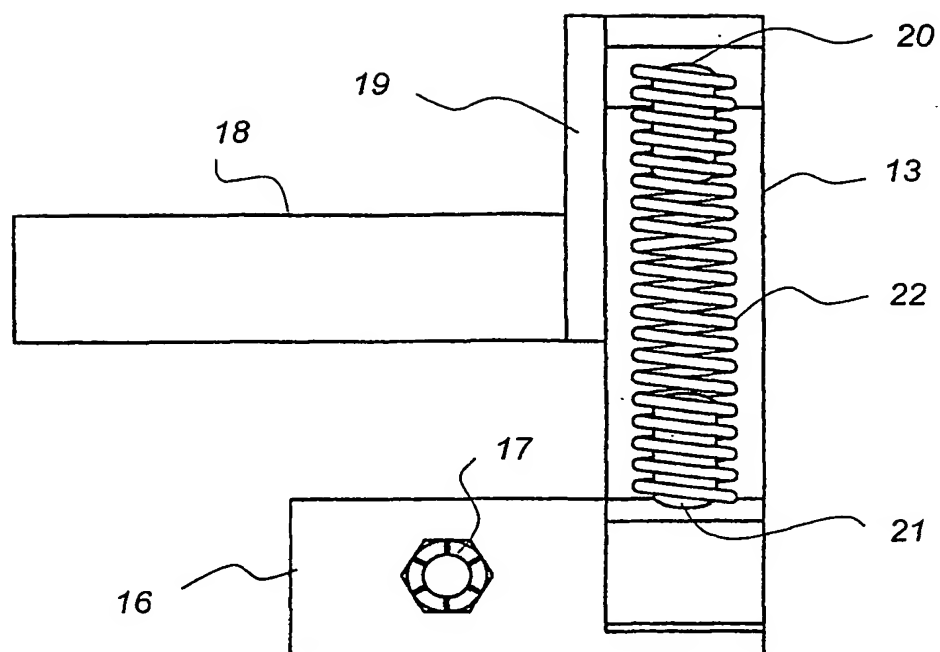


FIG. 2

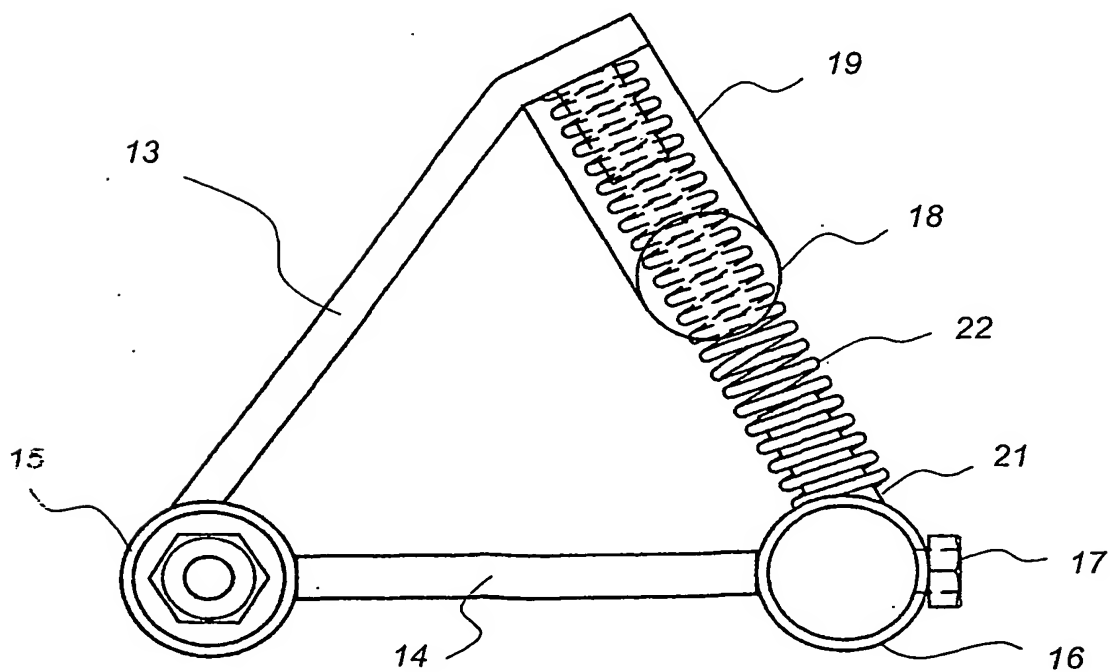


FIG. 3

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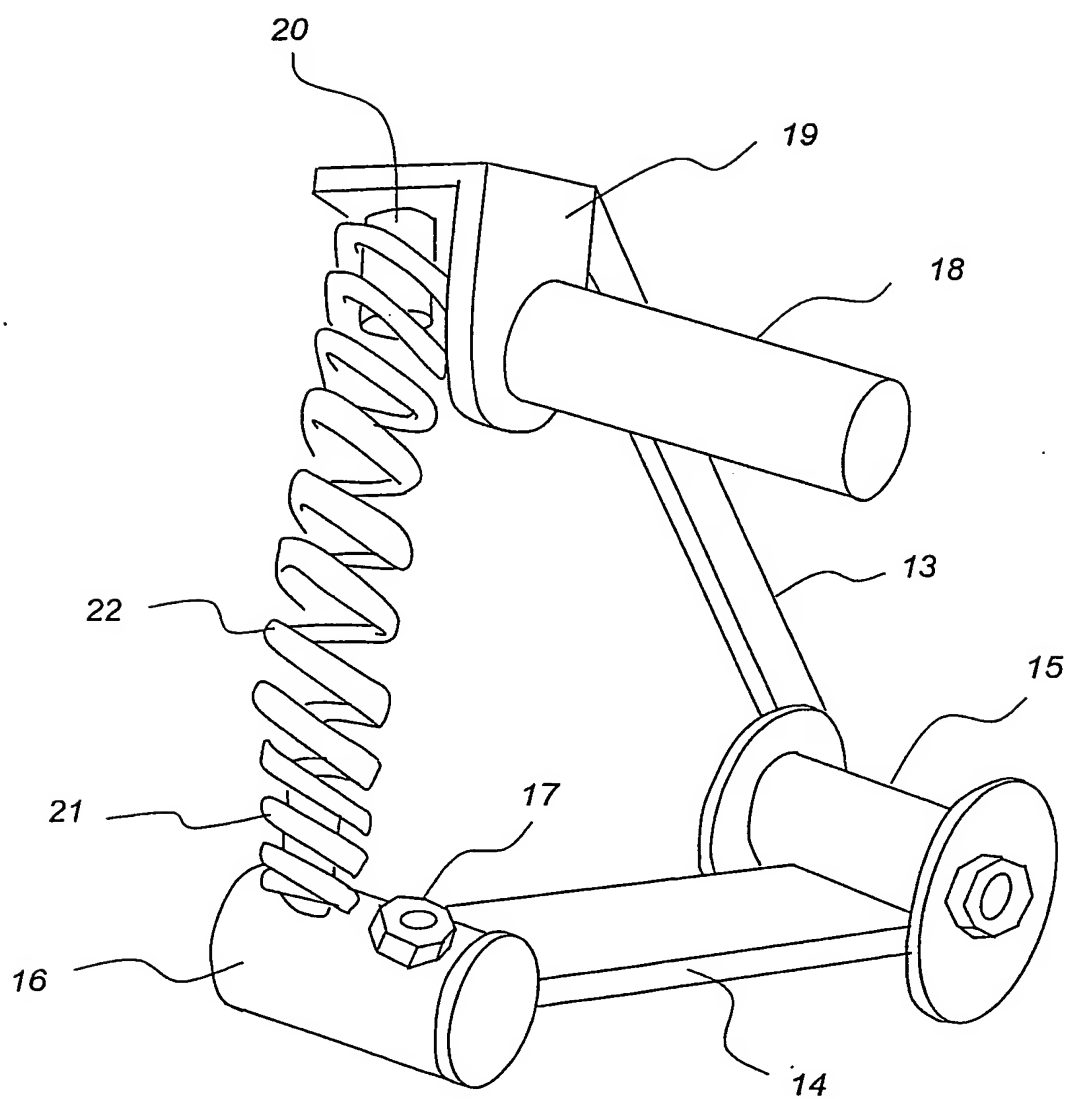


FIG. 4

## INTERNATIONAL SEARCH REPORT

 International application No.  
**PCT/AU03/01394**
**A. CLASSIFICATION OF SUBJECT MATTER**Int. Cl. <sup>7</sup>: A63B 55/08

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
USPTO and keywords golf, buggy and cart.Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
DWPI and keywords golf, buggy, trailer, cart, suspension, spring, scissor and like terms.**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6273452 B1 (WU) 14 August 2001 See figures 7 and 8	1-10
A	US 5683195 A (LIAO) 4 November 1997 See whole document	1-10
A	US 5582372 A (WU) 10 December 1996 See whole document	1-10



Further documents are listed in the continuation of Box C



See patent family annex

* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed		"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family
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2 December 2003Date of mailing of the international search report  
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Name and mailing address of the ISA/AU

 AUSTRALIAN PATENT OFFICE  
 PO BOX 200, WODEN ACT 2606, AUSTRALIA  
 E-mail address: pct@ipaustralia.gov.au  
 Facsimile No. (02) 6285 3929

Authorized officer

**ASHLEY DICKSON**  
 Telephone No : (02) 6283 2663

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/AU03/01394**

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report				Patent Family Member	
US	6273452	GB	2360256		
US	5683195	GB	2317414		
US	5582372	CA	2184120	GB	2309944
END OF ANNEX					